Citation:

Sato Y, Nakaya N, Kuriyama S, Nishino Y, Tsubono Y, Tsuji I. Meat consumption and risk of colorectal cancer in Japan: The Miyagi Cohort Study. *Eur J Cancer Prev*. 2006 Jun; 15 (3): 211-218.

PubMed ID: 16679863

Study Design:

Prospective cohort

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the association between total meat consumption and the risk of colorectal cancer in Japan.

Inclusion Criteria:

Age 40-64 years and lived in one of 14 municipalities of Miyagi Prefecture in rural northern Japan at baseline (June-August, 1990).

Exclusion Criteria:

- Previous diagnosis of cancer (including nonmelanoma skin cancer) ascertained either by self-report in the health habit questionnaire or from cancer record registry records
- Extreme levels of energy intake (5% below or above the range for all subjects).

Description of Study Protocol:

Recruitment

A mailed questionnaire was sent to men and women aged 40-64 years living in 14 municipalities of Miyagi Prefecture in rural northern Japan between June and August 1990.

Design

Prospective cohort study.

Dietary Intake/Dietary Assessment Methodology

- A self-administered 40-item food-frequency questionnaire (FFQ), with five items assessing

meat intake (beef, pork, ham or sausage, chicken and liver), was used to calculate the total weight of each type of meat consumed per day
- The questionnaire asked about the frequency of consumption and portion size was determined based on median values observed in 12-day dietary records collected form sub-samples of the subjects.

Blinding Used

Not applicable.

Intervention

Not applicable.

Statistical Analysis

- Person-years of follow-up for each subject was calculated from the beginning of follow-up (June 1, 1990) until the date of diagnosis of each colon cancer, the date of death, the date of moving out of the study area, or the end of the follow-up period (March 31, 2001)
- Daily consumption of total meat was grouped into quartiles, and specific meat types were categorized into four groups (almost never, one to two times per month, one to two times per week or three to four times per week or more)
- Separate analyses were carried out for each site of colorectal cancers
- Cox proportional hazards models were used to calculate relative risk (RR) for developing cancer
- Tests of linear trend were calculated by using the meat consumption category as an ordinal variable.

Data Collection Summary:

Timing of Measurements

- Diet was assessed with the baseline questionnaire
- Cases of colon or rectal cancer that occurred between baseline and March 2001 were identified throughout follow-up by linkage with the cancer registry.

Dependent Variables

Colon or rectal cancer: Cases were identified by the linkage of computerized records using four characteristics (name, sex, birthday and municipality of residence) with the Miyagi Prefectural Cancer Registry.

Independent Variables

- A self-administered FFQ assessed frequency (almost never, one to two times per month, one to two times per week, three to four times per week, almost every day)
- Total meat consumption per day (quartiles of cohort consumption)
- Consumption of specific meat types (beef, pork, ham or sausage, chicken, liver) per day: Four categories of consumption (almost never, one to two times per month, one to two times per week, three to four times per week or more).

Control Variables

- Sex

- Age
- Smoking status
- Alcohol consumption
- Body mass index (BMI)
- Education
- Family history of cancer
- Time spent walking
- Consumption of fat, calcium and dietary fiber.

Description of Actual Data Sample:

- *Initial N:* 47,605 (responded to questionnaire)
- *Attrition (final N):* 41,835 (after applying exclusion criteria)
- *Age:* 40-64 years at baseline
- *Ethnicity:* Survey conducted in Japan
- *Other relevant demographics:* Rural population
- *Anthropometrics:* None
- *Location:* Miyagi Prefecture, Japan.

Summary of Results:

Key Findings

- The age-adjusted and sex-adjusted RR (95% CI) for the highest vs. the lowest quartiles of meat consumption was 1.15 (0.89-1.49; P trend=0.14) for colorectal cancer, 1.23 (0.87-1.73; P trend=0.11) for colon cancer and 1.01 (0.68-1.50; P trend=0.86) for rectal cancer. Multivariate analyses did not substantially change these estimates
- Meat consumption was not significantly associated with the risk of cancer in either the colon or the rectum
- No specific meat type showed a dose-response relationship to the risk of colorectal cancer.

Other Findings

- There were 474 incident cases of colorectal cancer during the 11-year follow-up to March 2001
- The median consumption of total meat in the cohort was 52.1g per day
- Intake of chicken had a significant dose-response relationship to the risk of colon cancer (P trend=0.03).

Author Conclusion:

There was no association between the consumption of meat and the risks of colon and rectal cancers in Japan.

Reviewer Comments:

Study Strengths

- *The response rate to the questionnaire was high (91.7%)*
- *Cancer incidence was determined by linkage with a registry (highly precise records).*

Study Limitations

- *The dietary assessment was self-report, which would have resulted in some misclassification of exposure. This misclassification would have been non-differential and caused conservative estimates of association*
- *There may have been a lack of enough variation in questionnaire response categories for frequency of meat consumption.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes

3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	N/A
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A

5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	Yes
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	???
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes

8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	N/A
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes